SOV/126-7-5-21/25

AUTHORS: Pines, B. Ya. and Sirenko, A. F.

TITLE: Non-Equilibrium Conditions and Diffusion Creep in Metallo-Ceramic Bodies (Neravnovesnyye sostoyaniya i diffuzionnaya polzuchest' u metallokeramicheskikh tel)

PERIODICAL: Fizika metallov i metallovedeniye, Vol 7, Nr 5, pp 766-776 (USSR)

1959

ABSTRACT: In order to approach the conditions of diffusion creep experiments were carried out at relatively high temperatures and low applied stresses. Creep investigations under conditions of strain were carried out on metallo-ceramic specimens made by pressing powders of copper (electrolytic), nickel (carbonyl), iron, and mixtures of these metals. The grain size of Cu and Ni powder was 10-15 μ and that of iron powder 30-40 μ. The specimens were made in the shape of rods of 3 x 3 mm cross-section and a working length of 90 mm, with special heads of larger cross-section. The initial porosity of all specimens was 30-32%. The creep experiments were carried out at temperatures of up to 1250°C in a vacuum apparatus shown in Fig.1. The apparatus

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was evacuated by means of the diffusion oil pump MM-40. Loading of the specimens to be pulled was carried out with the help of an electromagnet. The grips in which the specimen heads were held were made of stainless steel and had a cross section one and a half times greater than that of the specimens, hence they remained practically undeformed in the experiments. The elongation of the specimens was determined according to the angle through which an indicating mirror had turned. In Fig.2 creep curves (dependence of the elongation $\Delta l/l$ on time t) for various specimens at 1000°C are shown. Fig.3a shows the concentration dependence of the complete elongation $\Delta l/l$ for 4 hours. Fig. 3б shows the concentration dependence of the initial creep rate v for Cu-Ni specimens after preliminary annealing. The same dependence for Ni-Fe alloys is shown in Fig.3в. In Fig.3г the dependence of the initial creep rate v on the preliminary annealing time is shown. In Fig.4a isothermal contraction curves for copper specimens at different stresses are shown; Fig.4б shows the dependence of initial creep rate, v_0, on stress at various temperatures, and Fig.4в shows the dependence of the established

creep rate v on stress at various temperatures. Fig.5a shows the dependence of the activation energy, Q, of creep on the time τ and temperature T of preliminary annealing for copper specimens. Fig.5б shows the concentration dependence of the activation energy Q for Cu-Ni specimens, and Fig.5в shows the concentration dependence of the activation energy of creep for Ni-Fe specimens. Fig.5г shows the same relationship for a Ni-W mixture. The preliminary annealing temperature was 1250°C. In Fig.6 the dependence of the relative elongation $\Delta l/l$ in creep on the time of testing for iron specimens having undergone a preliminary annealing treatment at 1250°C at a load of 100 g/mm^2 is shown. In Fig.7 the dependence of $\Delta l/l$ on the time of creep testing of iron specimens is shown. Fig.8 shows, for various testing temperatures, the dependence of $\Delta l/l$ on the time of testing for iron specimens which had not undergone a preliminary annealing treatment. Fig.9 shows the dependence of the established creep rate v on testing temperatures. In Fig.10 the dependence of ln(vT) on T is shown. The authors arrive at the following

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conclusions:

1. Metallo-ceramic specimens compressed from powders of pure metals and mixtures of metallic powders exhibit diffusion creep at high temperatures. At first a stage of unestablished creep is observed, in which deformation decreases with time. This is followed by a stage in which creep is established at a constant deformation rate.
2. Preliminary annealing of metallo-ceramic specimens decreases the initial rate and extent of the full creep deformation. After a sufficiently lengthy preliminary annealing treatment the first creep stage disappears completely.
3. Cold working (compression at room temperature) increases the initial rate and extent of the full deformation in diffusion creep at high temperatures. After cold working the first creep stage, which had been removed by preliminary annealing, is re-established.
4. Metallo-ceramic specimens made from mixtures of powders of metals diffusing into each other exhibit a much greater initial creep rate which corresponds to the first stage. After lengthy annealing the initial creep rate and the full deformation in creep decrease sharply.

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5. The creep deformation of a porous metallo-ceramic specimen which is brought about by straining at high temperatures noticeably decreases the sintering rate of the specimen.
6. Specimens with different initial porosities have different initial creep rates. After annealing, the creep rates of the specimens become identical.
7. The initial creep rate and the rate at which creep is established subsequently for metallo-ceramic specimens depend on the applied stress and are somewhat greater than that according to linear law. This may be due to departure from equilibrium conditions.
8. The activation energy of the creep process in one-component metallo-ceramic bodies is less than the equilibrium activation energy of volume self-diffusion. Only in iron powder specimens having undergone preliminary annealing the activation energy of creep (particularly the γ-phase) approaches the equilibrium value of the activation energy of self-diffusion. For specimens made of mixtures of various

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metal powders, having undergone lengthy annealing treatment, the activation energy of creep depends on the concentration of the mixtures according to the linear law.
9. The mechanism in the creep of metallo-ceramic specimens can be explained only on the basis of a diffusion mechanism in which non-equilibrium conditions causing an increase in the value of the self-diffusion coefficient and a decrease in activation energy are taken into consideration.
There are 10 figures and 11 references, of which 6 are Soviet and 5 English.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet imeni A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

SUBMITTED: May 6, 1958

~~18(3)~~ 18.6100 66735

AUTHORS: Pines, B. Ya., Sirenko, A. F. SOV/20-129-2-20/66

TITLE: Service Time Under Load as Dependent on the Applied Stress for Metalloceramic Iron Samples in the α and γ Phase

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 2, pp 310-313 (USSR)

ABSTRACT: Introducingly a report is made on various previous investigations dealing with this subject. According to S. N. Zhurkov and co-workers (Refs 1, 2) the following dependence of the service time τ on the load p and on the temperature T is experimentally observed: $\tau = \tau_0 e^{\frac{E-\gamma p}{kT}}$. In this case k denotes Boltzmann's constant, τ_0 and γ constants of the material, E - activation energy of the destruction processes the numerical value of which is the same for some metals with high heat of sublimation. The experiments described in the present paper were made with metalloceramic samples (length 30 mm, operating length 20 mm, cross section 3×3 mm^2) which were pressed from iron dust with the grain size $< 50\mu$ (average $\sim 30\mu$). Samples of different porosity were

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produced. The annealing of the samples is described in brief. The authors determined the service time under load for several samples of different porosity and by extrapolation to the value zero the value corresponding to a massive sample was determined. The change in service time due to porosity was only some per cents. The service time under load was determined at the temperatures of 600; 800; 900; 1000; and 1100° in a vacuum apparatus at pressures of $\sim 10^{-4}$ to 10^{-5} torr and in an interval of loads in which the service time varied by 3 to 4 orders of magnitude. The results of these experiments are illustrated by two diagrams. The calculated and the experimental curves are in agreement at the following values of the constants in the formula given by B. Ya. Pines (Ref 4):

$$\tau = \frac{C(kT)^2}{p^3 \delta^4 D} e^{-\frac{p \delta^3 \sqrt{n}}{kT}}$$ at 600, 800 and 900° : C = 5,

α = 430 mm^2.degree/kg, U_o^{α} = 52 - 54 kcal/g mol;

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at 1000° and 1100° : C = 5, α = 450 mm^2.degree/kg, U_0^{α} = 68 to 70 kcal/g mol. In the above formula C denotes a numerical factor of the order one, δ - the linear size of the atoms, n_o - the number of the vacancies, the combination of which corresponds to an initial "germination crack", D - the coefficient of autodiffusion. Moreover it holds that $\alpha = \delta^3 \sqrt{n_o}/k$. The values found for the activation energy of the destruction processes are in good agreement with the known values of the activation energy iron autodiffusion in the α and γ-phase. The concepts of diffusion are in complete agreement with the experiments described here. The problem of the service time of the alloys under stress has still to be subjected to an exact

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theoretical and experimental investigation. The second diagram shows the dependence of service time on temperature for different constant values of p. Above the point of the α - γ -phase transformation the service time increases jump-like. There are 2 figures and 6 Soviet references.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

PRESENTED: July 15, 1959, by G. V. Kurdyumov, Academician

SUBMITTED: July 7, 1959

69430

S/139/60/000/01/004/041

18.6200

E072/E334

AUTHORS: Pines, B.Ya. and Sirenko, A.F.

TITLE: The Problem of the Role of Closed Pores in Sintering in Powder Metallurgy

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, Nr 1, pp 23 - 28 (USSR)

ABSTRACT: The variation of final porosity of η_k of a sintered specimen with initial compaction pressure P was studied for various sintering schedules. Figure 1 taken from Ref 3 shows the relationship between the initial porosity η_H (largely determined by P) for $< 50\ \mu$ Cu powder after heating to 1 000 °C and Curve 1 - immediately cooling, Curves 2, 3, 4, sintering for 15, 60 and 240 min. Minimum η_k is found near 27% η_H and for the lowest lying curve, 4 , is about 10%. The non-monotonic relationship is due to gas pressure in the pores. Decrease in η_H does increase the area of intergranular contact thus increasing sintering rate, but also increases the number of closed pores which tends to give reduced sintering

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rate. Ref 3 also gave data on rates of shrinkage of unpressed powders of Cu both pure and with additions of other metals (low-melting). These are plotted in Figure 2 whence it can be seen that very large shrinkages were obtained, particularly with mixtures (e.g. Cu + 3% Pb, ~70% after 5 hours at 1 000°). Pressed mixtures (4.6 tons/cm^2), however, showed an expansion (Curves 7-9) though pure Cu (Curve 6) did not. The effect of vacuum pressing at 10^{-1}-10^{-2} mm Hg was now tried, a photograph of the special press being shown in Figure 3. Figure 4 shows $\eta_k - \eta_H$ plots for Cu so prepared after various holding times at 1 000 °; η_k decreases monotonically with η_H and can be as low as 5% for 8% η_H; sintering in H_2 or in vacuum gave almost identical results. If, however, oxidized Cu powder was used a minimum was again

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obtained (Figure 5); this was ascribed to release of gas on decomposition of the oxide. Some gas is probably still present, perhaps as oxide, in vacuum-pressed specimens, since unpressed specimens have η_k = 2% after 8 hours at 1 000 °C and < 1% after 12 hours. Further work was concerned with Ni-Al alloys. Trapped gas can cause marked bloating, as indicated in Figure 6, which suggests that this can largely be avoided by heating for several hours at 620° (below the melting point of Al) prior to sintering at 1 250 °C (specimen 5, 30% Al), since specimens 2-4 (10, 20 and 30% Al) heated directly to 1 250 ° bloated badly. Pure Ni (Specimen 1) showed no such effects. Bloating is ascribed to formation of liquid Al which rapidly seals any pores and prevents the escape of gas. Some reaction between Ni and Al occurs at 620° as indicated in Figure 4, which shows plots of shrinkage (for 1, 3 and 8 hours heating) as a function of composition. The relatively large expansion for intermediate compositions (maximum at ~ 50% alloy) is not due to bloating but to alloy

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formation. Under the microscope it is found that Al particles tend to disappear while the (initially) Ni particles expand (Figure 8 for 30% Al mixture, 8 hours at 620 °C, then heated to 1 250 °C and immediately cooled, x 400). Finally, Figure 9 shows shrinkage as a function of composition for 1, 3 and 5 hours at 1 250 °C following heating for 8 hours at 620 °C. There is a slight expansion for mixtures ~15 - 45% Al. It is emphasized that, in sintering a mixture of materials, it is important to outgas at temperatures below the melting point of any constituent. There are 9 figures and 3 Soviet references.

ASSOCIATION: Khar'kovskiy gosuniversitet imeni A.M. Gor'kogo (Khar'kov State University imeni A.M. Gor'kiy)

SUBMITTED: March 11, 1959

Card 4/4

S/148/60/000/002/005/008

18.6100
18.8200

AUTHORS: Pines, B.Ya., Sirenko, A.F.

TITLE: Diffusion Creep and Non-Equilibrium State in Metal Ceramics and Cast Metals

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, 1960, Nr 2, pp 81 - 89

TEXT: The following deviations from regularities of "viscous flow" were observed during investigations into diffusion creep of metal ceramics: the presence of an unsettled creep stage, non-linear dependence of the creep rate on the magnitude of applied stress, unequal rate and deformation of creep in tension and compression, and reduced values of the activation energy of creep, i.e., self-diffusion. Investigations into diffusion creep of metal ceramics subjected to pressure were carried out on samples of electrolytical copper with $\leq 50\ \mu$ grain size under a load of 10 g/mm^2 at 1,000°C. A high-vacuum device, shown in Figure 1, was used to investigate compression creep. Results of experiments are given in Table 1. It was established that the observed irregularities were caused by the non-equilibrium state of the samples.

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They can be fully eliminated by sufficiently extended high-temperature annealing. Furthermore, investigations were carried out into creep after hard facing of metal ceramics pressed from iron powder. Results of experiments are given in Table 2. It was established that hard facing speeded-up diffusion creep at high temperatures (e.g. in iron at 900°C) mainly at the unsettled stage. At lower temperatures (700°C for iron) hard facing caused a decrease in the creep rate. This proves that creep at such temperatures has not a purely diffusion but probably a dislocation nature. Results obtained from experiments with Co-Ni, Ni-Fe and Ni-W powders [Ref 6] were analogous to those obtained with other systems including the Cr + Mo systems. Pure component and 50% Cr + Mo powder mixtures were tested at 1,300°C in a vacuum under a load of 75 g/mm^2. The samples were preliminary annealed in a vacuum at 1,300°C and 1,500°C for up to 14 hours. Besides deformation creep, shrinkage in sintering during preliminary annealing was studied. Results of experiments are given in Figure 4. It was established that diffusion creep was always accelerated (mainly at the unsettled stage) in samples having excessive vacancies, arising as a result of non-uniform partial hetero-diffusion. In metal ceramic samples of Cr and Mo powder mixtures, the creep

S/148/60/000/002/005/008

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acceleration was correspondingly low at 1,300°C, when heterodiffusion occurred. Annealing at 1,500°C during 50 minutes delayed the creep of pure component samples; on the other hand, the creep of powder mixtures was accelerated. After extended annealing (8 hours) creep of powder mixtures was slowed down due to the gradual elimination of excessive vacancies.
There are: 1 photograph, 1 diagram, 3 tables, 3 graphs and 6 Soviet references.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: March 19, 1959

Card 3/3

81615
S/181/60/002/06/03/050
B122/B063

24.4100
18.8200

AUTHORS: Pines, B. Ya., Sirenko, A. F.

TITLE: Calculated and Experimental Values of the Durability of Loaded Metals and Alloys

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 6, pp. 1043-1051

TEXT: In the article under review, the authors compare the experimental values of the durability τ of loaded Sn, Pb, Al, Pt, Ag, and Cu with the values calculated from formula (1) (Ref. 1):

$$\tau = C\frac{(kT)^2 E}{p^3 \delta^4 D} \exp\left(-\frac{p\delta^3\sqrt{n_0}}{kT}\right) \quad (1).$$

p - pressure of the load, D - coefficient of natural diffusion, E - Young's modulus, δ - atomic linear dimension, n_0 - primary number of lattice vacancies, C - a constant. The experimental values of Pb, Sn, and Cu were determined in this work, and the values of Al, Pt, and Ag were taken from publications. Formula (1) is based upon the assumption of the tearing process propagating like a diffusion process.

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81615
S/181/60/002/06/03/050
B122/B063

Calculated and Experimental Values of the Durability of Loaded Metals and Alloys

Previous papers by the authors had shown that the activation energy U_o of the process leading to a rupture of the sample, and the values of the activation of self-diffusion are practically equal (Refs. 2,4), but that the use of the empirical formula (2) $\tau = Ae^{-ap+\frac{U_o}{RT}}$, where A and a are constants, involves some difficulties in the determination of U_o (Ref. 3). Experiments on Sn, Pb, and Cu as well as a comparison of data known from publications concerning the durability of the metals Al, Pt, and Ag under load showed that the durability τ as dependent on p and T is very well reproducible by formula (1) in experiments conducted at room temperature and higher temperatures. On a proper selection of coefficient C in formula (1), the activation energy of the tearing process for all metals within the error limits is in fairly good agreement with the activation energies of self-diffusion. When trying to determine the activation energy from formula (2), in which, since A = const., the pre-exponential factor is independent of P and T, only few empirical constants were obtained, and not U_o itself. Formula (2) cannot be used to calculate U_o of alloys. Figs. 1-7 show experimental and calculated

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81615

Calculated and Experimental Values of the Durability of Loaded Metals and Alloys

S/181/60/002/06/03/050
B122/B063

dependences τ - p for the various metals. The student I. F. Romanenko is mentioned. There are 6 figures and 13 references: 12 Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN USSR, Khar'kov
(Physicotechnical Institute of the AS UkrSSR, Khar'kov)

SUBMITTED: December 3, 1959

X

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S/148/60/000/005/005/009

AUTHORS: Pines, B.Ya., Sirenko, A.F.

TITLE: "Recovery" Under Load in Processes of Diffusion Creep of Metal Ceramics

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, 1960, Nr 5, pp 121 - 129

TEXT: Diffusion creep in porous metal ceramics was studied by experiments made with specimens pressed from copper powder (electrolytic origin; grain size $< 50\mu$), nickel powder (reduced from carbonyl; grain size 10 - 15μ) and tungsten (grain size 5 - 10μ). The experiments are illustrated by a number of graphs. It was established that metal, alloy and, particularly, metal ceramic specimens, subjected to diffusion creep at raised temperatures, revealed considerable retardation of other diffusion processes, such as sintering, recrystallization and heterodiffusion. This retardation was connected with the non-equilibrium state of the specimens and arose in connection with the gradual approach to the equilibrium. Diffusion coefficients decreased correspondingly. Thus, speeded-up "recovery" of equilibrium properties under

Card 1/2

PINES, B.Ya.; SIRENKO, A.F.

Correlation between the rate of creep and the durability of metals under the effect of stress. Fiz. met. i metalloved. 10 no.3:382-389 S '60. (MIRA 13:10)

1. Khar'kovskiy gosudarstvennyy universitet im. A.M.Gor'kogo.
(Creep of metals) (Metals--Fatigue)

80085
S/020/60/131/06/23/071
B014/B007

IP 6200

AUTHORS: Pines, B. Ya., Sirenko, A. F.

TITLE: The Problem Concerning the Conditions of Reversibility of the Destruction Processes of Metals Under Load

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 131, No. 6, pp. 1312 - 1315

TEXT: The experiments described were made with powder-metallurgical samples which were pressed from electrolytic copper. The samples had an initial porosity of 17 - 18%, which was reduced to 3 - 4% by sintering at 1050°C (for 24 hours). The life of a series of 35 equal samples was determined after applying the same load in each case. From these values the average life was determined. The life of a further series of 35 samples under load was determined after intermediate annealing. Also in this case the average life was determined. In Fig. 1 the results of life determination at room temperature without intermediate annealing and of life in the case of intermediate annealing at 600°, 900°, and 1040°C are graphically represented. In Fig. 2 the analogous results of durability determination under stress at 600°C are shown. It is found that intermediate annealing of four hours at 1040°C produces the same results as intermediate annealing for ten

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The Problem Concerning the Conditions of Reversibility of the Destruction Processes of Metals Under Load

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B014/B007

hours at 900°C; for a complete healing of defects, annealing for 35 hours at 1040°C is necessary. Fig. 3 graphically represents the dependence of the quantity $\Delta\tau = \overline{\tau_1 + \tau_2} - \bar{\tau}$ on the time t (τ_1 and τ_2 are the life before and after intermediate annealing, $\bar{\tau}$ is the mean life without intermediate annealing). Herefrom, conclusions are drawn as to the diffusion-character of healing. By extrapolation of the straight lines obtained from the experimental data, the annealing time necessary for complete healing of the defects is determined as being 105 hours at 600°C, and as being 16 hours at 1040°C. The ratio between these two times is about 7.2 and corresponds to the ratio between the coefficients of the self-diffusion of copper at these two temperatures. Thus, all arguments indicating the diffusion-character of the growth of cracks after stresses are strengthened. There are 3 figures and 5 references, 4 of which are Soviet.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

PRESENTED: January 15, 1960, by G. V. Kurdyumov, Academician

SUBMITTED: December 12, 1959

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S/020/60/134/005/011/023
B019/B060

AUTHORS: Pines, B. Ya. and Sirenko, A. F.

TITLE: The Mechanism of the Rupture Life of Metals Under Stress

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 5, pp. 1061 - 1064

TEXT: Attempts have been made in previous papers to explain the rupture life of metals under stress as a diffusion of microcracks rising to a critical size in metals with a subsequent avalanche-like growth of the cracks. Other authors have been able to prove that the activation energy of the rupture process practically coincides with the activation energy of self-diffusion, and have thus again confirmed this view. The article under consideration reports on tests made on metalloceramic Cu-specimens, which confirm the diffusion mechanism. The copper specimens all had a composition deviating from the state of equilibrium. Rupture life under stress at room temperature, at 600°, 900°, and 1040°C was investigated. To avoid plastic deformations, the specimens had a sharp notch in the middle of the gage length. Tests revealed that the

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The Mechanism of the Rupture Life of Metals Under Stress

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rupture life of specimens at room temperature is the same as in electrolytic copper. Differences, however, become considerable at higher temperatures. Preliminarily strain-hardened - cold-worked from 20 to 50% reduction - sintered specimens had a rupture life which was the shorter the higher the reduction. The shortest rupture life was recorded for electrolytic copper. These results are believed to confirm the theory of the diffusion mechanism of metal rupture under stress. There are 3 figures and 8 Soviet references.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

PRESENTED: May 28, 1960, by G. V. Kurdyumov, Academician

SUBMITTED: March 16, 1960

Card 2/2

S/161/62/004/007/023/037
B102/B104

AUTHORS: Pines, B. Ya., and Sirenko, A. F.

TITLE: Concentration dependence of creep rate and longevity under load of metal alloys of the systems iron - carbon and iron - copper at elevated temperatures

PERIODICAL: Fizika tverdogo tela, v. 4, no. 7, 1962, 1901-1910

TEXT: The concentration dependences of the mechanical properties of Fe - C alloys were studied in cast and powder-metallurgical specimens. The former contained < 0.02 (Armco), 0.08, 0.46 and 1% of C with impurities according to ГОСТ(380-50)(GOST(380-50)) for the types of steel МСт.1 (MSt.1), МСт.5 (MSt.5) and У-10 (U-10); the latter contained 0.05, 0.1, 0.3, 0.5 and 0.8% of C. All specimens were 80 mm long and had a cross section of 2.5·2.5 mm^2. The measurements were made at 700-1100°C. The Fe-Cu specimens were pressed from Armco-iron powder and electrolytic Cu (grain size < 50 μ) in eight different concentrations. After sintering at high temperatures the

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Concentration dependence of creep ...

measurements were carried out under stresses of 130-2500 g/mm^2 at 800, 900 and 1000°C. Results: In Fe-C alloys the creep rate is proportional to the self-diffusion coefficient at all temperatures and concentrations. The same tendency was observed at Fe - Cu. In Fe - Cu alloys the concentration dependence of the creep rate is a non-linear function at all temperatures; it is always lower than would be implied by a linear law. This fact is attributed to a boundary effect of the different types of grains. The creep rate V is a power function of the stress $p : V \sim p^n$. For Fe-C $n = 4.0$, for Fe-Cu $n = 4.3$-4.5. As regards stresses which are not too small, this is in agreement with experimental data. In first approximation $\log V\tau$ is independent of stress and temperature (τ - longevity under stress) but depends on the structural state and concentration of the alloy. It differs greatly for cast and powder-metallurgical specimens of the same concentration and depends greatly on the heat treatment. For Fe - Cu alloys, $\log V\tau$ varies most strongly in the single-phased regions and weakly in the two-phased regions of the equilibrium diagram. The approximate constancy of $\log V\tau$ is not inconsistent with the relation $V \sim Dp^n$ and that obtained for τ by Pines

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B102/B104

(FTT, 1, 2, 265, 1959). There are 11 figures.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo
(Khar'kov State University imeni A. M. Gor'kiy)

SUBMITTED: March 1, 1962

Card 3/3

S/181/62/004/010/012/063
B108/B104

AUTHORS: Pines, B. Ya., and Sirenko, A. F.

TITLE: The kinetics of the creep of metals of high temperatures

PERIODICAL: Fizika tverdogo tela, v. 4, no. 10, 1962, 2727 - 2732

TEXT: The laws governing the creep of metals were studied on specimens of electrolytic copper, previously rolled and annealed for 20 hrs at 1050°C. The change in load necessary to maintain a constant creep rate over a wide temperature range was checked in order to verify the formula

$$V = Mp^n \exp(-Q/RT)$$

(J. Dorn. J. of Mechanics and Physics of Solids, 3, 85, 1954), where V is the creep rate, p is the load, Q is the activation energy. The experimental results obtained with an arrangement described in FMM, 7, 766, 1959 showed this formula to be correct. The exponent n decreases with increasing temperature down to n = 1 at about 950°C. There are 5 figures.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

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Card

34730
S/070/62/007/001/003/022
E132/E460

24.7200 (1153)

AUTHORS: Pines, B.Ya., Sirenko, A.F.

TITLE: The determination of the dispersion and distortion of a lattice by means of the harmonic analysis of the forms of the X-ray powder lines

PERIODICAL: Kristallografiya, v.7, no.1, 1962, 20-30

TEXT: An examination is made of the errors arising in the Fourier analysis of the form of lines in an X-ray powder photograph because of the inexact separation of the line from the background. It is shown that errors of this kind lead to a parallel displacement of the ordinates of the Fourier transform in the semi-logarithmic plot of $z = -\log A_n = z(n)$, where A_n is the n-th order Fourier coefficient. It is shown that the errors conditioned by the differences between the calculated Fourier coefficients, reckoned over an infinite interval, and the coefficients corresponding to a finite interval of subdivision for the case of the Cauchy curve, also produce a parallel displacement of the ordinates of the curve $z = -\log A = z(n)$. A calculated verification, carried out from synthetic curves of the Cauchy type,

The determination of ...

of the Gaussian type and of mixed type, showed that the departure of the experimentally constructed curve of $z = -\log A_n = z(n)$ from the calculated one always leads to a parallel displacement of the ordinates of the curve. On this basis a general method of analysing an interference line appears to be the construction of the Fourier transform and the approximation by the function $z = z_0 + Mn + Nn^2$ to the values found for $z = -\log A_n$. The coefficients M and N can be found from the experimental values of z for all integral values of n except n = 0.
There are 4 figures and 1 table.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A.M.Gor'kogo (Khar'kov State University imeni A.M.Gor'kiy)

SUBMITTED: February 17, 1961

Card 2/2

PINES, B.Ya.; SIRENKO, A.F.

Determining the dispersity and lattice distortions in U-10 steel following quenching and tempering. Kristallografiia 7 no.1:125-127 Ja-F '62. (MIRA 15:2)

1. Khar'kovskiy gosudarstvennyy universitet.
(Steel--Heat treatment)
(Crystal lattices)

S/126/62/014/005/006/015
E193/E383

AUTHORS: Pines, B.Ya. and Sirenko, A.F.

TITLE: On the problem of high-temperature mechanical properties of metal specimens in the equilibrium and non-equilibrium condition

PERIODICAL: Fizika metallov i metallovedeniye, v. 14, no. 5, 1962, 693 - 699

TEXT: The rate of diffusion processes, which play an important part in the deformation of metals at elevated temperatures, depends on whether or not the metal is in a state of equilibrium. This can be explained in terms of a hypothesis that the process of "healing" of defects in a distorted crystal lattice is accompanied by the formation of a considerable number of excess vacancies accelerating all the diffusion processes. The object of the present investigation was to check the validity of this hypothesis by obtaining more detailed, systematic data on the effect of work-hardening and annealing on the mechanical properties of metals at elevated temperatures. Creep tests were conducted on Ni, Fe and Al specimens in both cold-worked (20-70% reduction in thickness) and annealed

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On the problem of ....

conditions. The test temperature ranged from 800 - 1 100 °C for Ni, from 600 - 1 100 °C for Fe and from 20 - 350 °C for Al, the figures for the applied stress being up to 6 kg/mm^2 for Ni, up to 5 kg/mm^2 for Fe and up to 16 kg/mm^2 for Al. All the three metals studied in the annealed condition had a time-to-rupture τ longer and a rate of steady creep v slower than the cold-worked specimens; this applied to tests carried out at elevated temperatures, cold-working and annealing having an opposite effect on τ and v at room temperature. In the case of Fe, the beneficial effect of high-temperature annealing on τ was observed in α-Fe only, no difference between cold-worked and annealed specimens having been observed in specimens tested in the γ-range, i.e. at temperatures higher than 910 °C. This finding supported the hypothesis that the effect of annealing was associated with "healing" of the crystal-lattice defects. Finally, the product τv of cold-worked specimens was found to be lower than that of annealed materials, this difference increasing with increasing degree of preliminary, cold plastic deformation. There are 4 figures.

Card 2/3

On the problem of ....

S/126/62/014/005/006/015
E193/E383

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo
(Khar'kov State University im. A.M. Gor'kiy)

SUBMITTED: February 28, 1962

Card 3/3

L 18052-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD

ACCESSION NR: AP3000101 S/0126/63/015/004/0584/0591

AUTHORS: Pines, B. Ya.; Sirenko, A. F.

TITLE: Speed of the diffusive creep in metals at submelting temperatures

SOURCE: Fizika metallov i metallovedeniye, vol. 15, no. 4, 1963, 584-591

TOPIC TAGS: creep in metal , creep in copper, velocity of creep

ABSTRACT: According to the existing postulates, the diffusive creep in the homogeneously stressed bodies is caused by the existence of atomic sources and voids inside and at the periphery of the body. The formulas expressing the speed of a steady diffusive creep derived by C. J. Herring, I. M. Lifshits, J. Harper, L. Shepard, and J. Dorn are compared; the theoretical and experimental data concerning the effect of the specimen substructure on the creep velocity are discussed. The experiment involved the study of the creep velocity variation (under tension) in 13 electrolytic copper samples. The samples, differing in grain sizes, were subjected to various treatments before experiment. The creep velocity measurements in all the samples were made at the same temperature (1040C) and load ($p=25 g/mm^2$). The experimental conditions corresponded to the diffusive

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L 18052-63
ACCESSION NR: AP3000101

creep the velocity of which depends on the applied stress p. The creep velocity variation observed in these specimens was in the interval from 5.6×10^{-5} 1/sec to 3×10^{-8} 1/sec. The authors conclude that the difference in the speed of a steady creep at the temperature 1040C may amount to more than 3 orders of magnitude and that this speed varies on the structural and substructural state of the specimen, determined by the kind of the preliminary treatment. However, neither of the assumed substructure types, which determine the distance between the atomic sources and voids, can explain the broad range of velocity variations. Possibly the effects obtained experimentally were caused by the superposition of various substructure types. Orig. art. has: 4 formulas, 1 table, and 6 figures.

ASSOCIATION: Khar'kovskiy gosudarstvenny*y universitet im. A. M. Gor'kogo (Khar'kov State University)

SUBMITTED: 03Sep62 DATE ACQ: 12Jun63 ENCL: 00

SUB CODE: ML NO REF SOV: 007 OTHER: 002

Card 2/2

L 43901-65 EEC(b)-2/EWP(z)/EWA(c)/EWT(l)/EWT(m)/EWP(b)/T/EWA(d)/EWP(t) Pi-4
IJP(c) GG/JD
ACCESSION NR: AP5006867 S/0181/65/007/003/0687/0694

38
36
B

AUTHOR: Pines, B. Ya.; Sirenko, A. F.

TITLE: Formation of diffusion porosity in self diffusion

SOURCE: Fizika tverdogo tela, v. 7, no. 3, 1965, 687-694

TOPIC TAGS: diffusion porosity, self diffusion, vacancy motion, dislocation motion, pore formation, crystal lattice distortion

ABSTRACT: To determine the conditions under which diffusion porosity appears via self diffusion, and the laws governing its development, several experiments were carried out in bodies made up of parts of the same material (copper) but of different structure (cast, highly annealed, deformed [cold hardened], and metal-ceramic). The tests have shown that heating a composite body consisting of atoms of one kind but containing parts with different degrees of crystal-lattice distortion leads to the occurrence of diffusion porosity in that part of the body where the lattice distortions are smaller. The presence of porosity in parts of the body having larger distortion (larger dislocation density) does not hinder the development of diffusion porosity in the part closer to thermodynamic equilibrium,

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L 43901-65

ACCESSION NR: AP5006867

2

even when pores of smaller radius than in the distorted section are obtained in the section closer to the equilibrium. These pores no longer serve as sinks for vacancies. If closed pores filled with gas are present in the distorted part of the body, this part does not shrink upon heating, but grows (under the influence of the gas pressure), i.e., the pores become sinks for vacancies and the formation of diffusion porosity in the neighboring less distorted regions of the body greatly decreases, or may stop completely. "Student P. A. Flomina participated in the experimental part of the work." Orig. art. has: 6 figures, 3 formulas, and 1 table.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University)

SUBMITTED: 16Jun64 ENCL: 00 SUB CODE: NP, SS

NR REF SOV: 007 OTHER: 002

Card 2/2 mb

PINES, B.Ya.; SIRENKO, A.F.

Kinetics of sintering and diffusion creep in solids. Fiz. met. i metalloved 20 no.1:84-96 Jl '65. (MIRA 18:11)

1. Khar'kovskiy gosudarstvennyy universitet imeni A.M.Gor'kogo.

LATYSHEVA, V.A.; LILICH, L.S.; SIRENKO, A.S.

Effect of certain salts and acids on the rate of oxidation of I^- ions by Fe^{3+} ions. Vest.LGU 15 no.10:121-130 '60. (MIRA 13:5)

(Iodides) (Iron)

Sirenko, B.H.

#8

PHASE I BOOK EXPLOITATION SOV/6352

Akademiya nauk SSSR. Vychislitel'nyy tsentr

Nomograficheskiy sbornik (Collected Papers on Nomography, no. 1.) Moscow, 1962. 248 p. 1800 copies printed.

Resp. Ed.: G. S. Khovanskiy, Candidate of Technical Sciences; I. A. Orlova; Tech. Ed.: A. I. Korkina.

PURPOSE: This collection of papers is intended for those engaged in research on and design of nomographs.

COVERAGE: This collection contains 27 papers concerning various aspects of the theory, construction, and use of nomograms for the solution of algebraic, functional, transcendental, and differential equations. No personalities are mentioned. There are 122 references: 102 Soviet (1 of which is a translation from the English), 8 German, 5 French, 2 English, 2 Spanish, 2 Rumanian, and 1 Czech.

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Collected Papers on Nomography

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Collected Papers on Nomography SOV/6352

This paper is based on the author's report at the Conference on Computational Mathematics in Moscow, November 1959.

II. Stammberger, A. (Scientific Director of the Nomographic Group of the Institute of Applied Mathematics and Mechanics of the German Academy of Sciences, Berlin). Nomography in the German Democratic Republic 15

Translation of a report in German presented at the Computing Center of the Academy of Sciences of the USSR (Moscow) at the end of May 1962 and at the First All-Union Geometric Conference (Kiyev), on 28 May 1962.

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The content of this paper was presented by the author at the First All-Union Geometric Conference.

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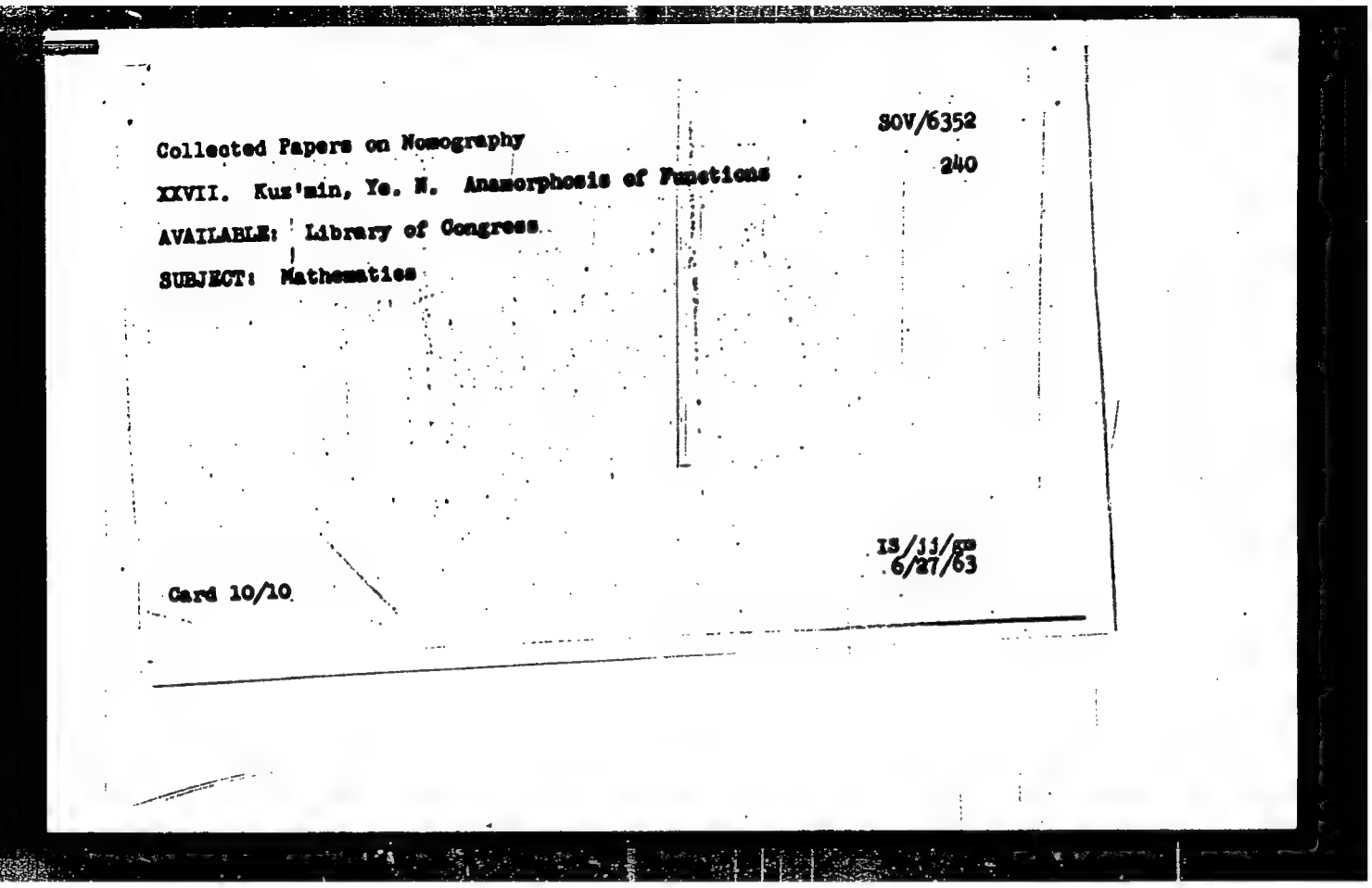

Collected Papers on Nomography SOV/6352

XXVII. Kuz'min, Ye. N. Anamorphosis of Functions 240

AVAILABLE: Library of Congress

SUBJECT: Mathematics

IS/jj/gm
6/27/63

Card 10/10

ANDON'YEV, S.M., kandidat tekhnicheskikh nauk.; FILIP'YEV, O.V., inzhener.; VOLKOV, V.F., inzhener.; SIRENKO, B.M., inzhener.

Air-cooled valve gate of new design. Metallurg 2 no.3:40 Mr '57. (MIRA 10:4)

1. Giprostal'.
(Open hearth furnaces)

ANDON'YEV, Sergey Mikhaylovich, doktor tekhn. nauk. Prinimali uchastiye: BELAN, F.I., inzh.; MALAMUD, Ye.A.; TSELUYKO, Yu.I., inzh.; KERZHNER, S.M., inzh.; SIRENKO, B.M., inzh.; FILIP'YEV, O.V., inzh.; KOCHO, V.S., doktor tekhn. nauk, prof., retsenzent; NITSKEVICH, Ye.A., red.; YEZDOKOVA, M.L., red. izd-va; DOBUZHINSKAYA, L.V., tekhn. red.

[Evaporation cooling of metallurgical furnaces] Isparitel'noe okhlazhdenie metallurgicheskikh pechei; osnovnye polozheniia. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1961. 447 p. (MIRA 14:10)

(Metallurgical furnaces—Cooling)

81515

SOV/137-59-5-10790

18.8200

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 5, p 190 (USSR)

AUTHORS: Khotkevich, V.I., Sirenko, G.A., Mikhel'son, M.L.

TITLE: Absorption of Energy During Low Temperature Deformation of Nickel

PERIODICAL: Uch. zap. Khar'kovsk. Un-t, 1958, Vol 98, Tr. Fiz. otd. fiz.-matem. fak., Vol 7, pp 359 - 363

ABSTRACT: The authors investigated the effect of the deformation temperature on the magnitude of latent Ni deformation energy within the temperature range of liquid N_2 and room temperature. The following pulse method was used for measurements. Deformed and standard specimens were connected to a bridge circuit and current pulses of a short duration (0.01 - 0.02 sec) were passed through. The pulse intensity was sufficient to anneal the hard-faced specimen. During the annealing process, due to the liberation of latent deformation energy, the bridge balance changed; this served as a criterion to calculate the latent deformation energy. The error of measurement was about ~7%. The specimens consisted of wires of 0.25 mm diameter and ~50 mm length. They were deformed by

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SOV/137-59-5-10790

Absorption of Energy During Low Temperature Deformation of Nickel

compression between two plane parallel plates. It was established that a decrease in the deformation temperature caused an increase of the latent deformation energy from 0.53 cal/g at room temperature to 2.2 cal/g at 77°K. The energy consumed for deformation did not remain constant, but decreased from 17.5 to 5.38 cal/g, respectively. Consequently, during constant work the temperature dependence of the latent deformation energy will be still more pronounced. Results obtained confirm the assumption that relaxation processes occur with sufficient intensity even at room temperature. In the investigated range of temperatures the linear dependence between the increment $1/\rho$ and the magnitude of latent deformation energy for Ni was established.

L.B.

Card 2/2

SOV/126-8-2-12/26

AUTHORS: Golik, V.R., Sirenko, G.A. and Khotkevich, V.I.

TITLE: X-ray Study of Deformation of Metal Crystal Lattices, Deformed at Low Temperatures

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 2, pp 235 - 239 (USSR)

ABSTRACT: Deformation at 77 ^{o}K of commercially pure iron and aluminium and spectrographically pure lead was studied. The specimens were initially free from distortion and were deformed by uni-axial compression at both room temperature and temperature of liquid nitrogen. The latter samples were investigated in a low-temperature X-ray chamber (Figure 1). The specimen was partly immersed and also sprayed by liquid nitrogen, giving a variation of less than $\pm$ 0.2^{o}. An approximate method (B. Ya. Pines - Ref 8) was used to distinguish between the effects of "fine dispersion" and "micro-distortion". Figure 3 shows that even at small deformations (2-5%) a fine dispersion is developed with coherent regions of approximately 10^{-5} cm. With greater deformation these

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X-ray Study of Deformation of Metal Crystal Lattices, Deformed at Low Temperatures

regions increase in size by 2-3 times. Figures 4 and 5 show the relation between micro-deformations and distance for aluminium and armco iron. Similar curves were obtained for lead. These show that the main effect of distortion of the crystal lattice is obtained at the very beginning of deformation. Deformation at low temperatures produces more micro-distortion than at room temperature. Curves of relative micro-deformation at low temperature are shown in Figure 6. These show it is inhomogeneous and passes through a maximum. This maximum increases with increasing deformation and decreasing temperature. Micro-stresses in the samples were calculated and an attempt was made to relate them to creep limit. It was shown that the micro-stresses are always less than the creep limit. Figure 7 shows that a linear relationship exists between the micro-deformation of the lattice and the creep limit. A similar relationship occurs with

X-ray Study of Deformation of Metal Crystal Lattices, Deformed at Low Temperatures

hardness. From the obtained data, the mean values of the elastic energy of deformation were calculated. With 50% deformation at 77 °K there are 0.02, 0.09 and 0.34 cal/mol for lead, aluminium and iron, respectively. These values are only small percentages of the total latent energies of deformation . There are 7 figures and 14 references, of which 10 are Soviet and 4 English.

ASSOCIATIONS: Ukrainskiy institut metallov(Ukrainian Institute of Metals)
Kharkovskiy gosudarstvennyy universitet
(Khar'kov State University)

SUBMITTED: April 9, 1958

SOV/126-8-5-9/29

18.9000

AUTHORS: Sirenko, G.A., and Khotkevich, V.I.

TITLE: X-Ray Crystallographic Study of the Temperature Dependence of Metallic Crystal Lattice Distortions

PERIODICAL: Fizika metallov i metallovedeniye, Vol 8, 1959, Nr 5, pp 700-704 (USSR)

ABSTRACT: It has been shown in previous papers (Refs 1, 2) that a lowering of deformation temperature leads to a considerable decrease in the size of coherent scattering regions and to an increase in micro-stresses. A more detailed study was intended of the nature of the dependence of these factors on the deformation temperature in a wide temperature range, particularly at small deformations. Massive specimens of technically pure aluminium and spectroscopically pure lead were plastically deformed by uniaxial compression at 90, 195, 255 and 293 °K. Immediately after deformation, without intermediate annealing, the specimen was placed in a low-temperature chamber (see Ref 1) and its X-ray diffraction pattern was photographed. It was kept at liquid-nitrogen temperature during the X-ray exposure in order to exclude the influence of relaxation. X-ray

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X-ray Crystallographic Study of the Temperature Dependence of Metallic Crystal Lattice Distortions

irradiation was carried out by the inverse exposure method in a copper radiation with a sharp-focus X-ray tube having an adjustable focal spot. The (511) lines of aluminium and the (620) lines of lead were studied. The average linear size of the coherent scattering regions and the micro-stresses were found by harmonic analysis of the shape of interference lines. The method of X-ray irradiation and treatment of results has been described more fully by Golik et al (Ref 2). In Figs 1a and 2a the dependence of the average linear size of the coherent scattering regions $\bar{D}$ on the percentage deformation is shown graphically for the investigated metals at the above temperatures. In Figs 1b and 2b the dependence of the average linear size of the coherent scattering regions on deformation temperature is shown. In Fig 3 the same dependence is shown for aluminium. Apart from $D_{\ldots}$ the values of the absolute $\sqrt{\Delta L^2}$ and relative $\sqrt{\Delta L^2}/L = \varepsilon$ deformation were also calculated. The nature of change of these factors with drop in

X-ray Crystallographic Study of the Temperature Dependence of Metallic Crystal Lattice Distortions

temperature agrees with the data given by Golik (Ref 2), i.e. a decrease in deformation temperature steadily increases $\sqrt{\overline{\Delta L}^2}$ and $\bar{\varepsilon}$. The average percentage deformation ε was calculated by graphic integration and averaging along the depth of the column (600 and 800 Å for Pb and Al, respectively). A graph representing the dependence of this factor on the degree of deformation for lead specimens deformed at various temperatures is shown in Fig 4. If the value of ε is known, the average residual micro-stress can easily be calculated. It is obvious that the modulus of elasticity for a given crystallographic direction and temperature should be included in the calculation. This has proved to be possible for aluminium (Refs 6-8). The results of this calculation are shown in Fig 5, where $\sqrt{\overline{\sigma}^2}$ is plotted against degree of deformation for various temperatures of deformation.

There are 5 figures and 8 references, of which 7 are Soviet and 1 is English.

67757

SOV/126-8-5-9/29

X-ray Crystallographic Study of the Temperature Dependence of Metallic Crystal Lattice Distortions

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: July 4, 1959

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S/126/60/009/06/022/025
E073/E535

AUTHORS: Golik, V.R., Sirenko, G.A., Khotkevich, V.I. and Pines, B.Ya.

TITLE: On the Problem of X-ray Deformation of Distortions in the Crystal Lattice

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 6, pp 937 - 938 (USSR)

ABSTRACT: This is a reply to the criticism of Smirnov (see pp 936 - 937 of this issue) by the authors of the two papers referred to, i.e. "X-ray Diffraction Studies of Lattice Distortions in Metals Deformed at Low Temperatures" by Golik, Sirenko and Khotkevich and the paper published in Dokl.Ak.nauk SSSR, 1955, Nr 103, p 601, by B.Ya. Pines.

ASSOCIATIONS: Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo (Khar'kov State University im A.M. Gor'kiy)
Ural'skiy institut metallov (Ural Institute of Metals)

SUBMITTED: January 15, 1960

Card 1/1

An X-ray study of the kinetics of ... S/126/62/014/004/009/017
E132/E135

They were examined in a special low-temperature X-ray camera without being allowed to warm up. Recording was photographic, using (222) reflexions for Ni and Cu, (400) for Al, and (400) and (600) for Pb. The $K\alpha_1$ component of the doublet was used, Pines' method of Fourier inversion being applied. Kurdyumov-Lysak's method of using two orders of reflexion was applied for Pb as a control, good agreement being obtained. The curves of the dependence of the dimensions of the coherent scattering regions on time of relaxation showed, particularly in cases of low (5%) deformation, a minimum after some 40 hours followed by a linear increase with $T^{1/2}$ thereafter.
There are 5 figures.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet
(Khar'kov State University)

SUBMITTED: February 26, 1962.

Card 2/2

SIRENKO, G.A.; KHOTKEVICH, V.I.

Accuracy of determining the dimensions of coherent scattering regions and the magnitude of microstresses by the method of harmonic analysis of interference line shapes. Fiz. met. i metalloved. 14 no.1:55-60 Jl '62. (MIRA 15:7)

1. Khar'kovskiy gosudarstvennyy universitet.
(Crystal lattices) (X rays--Scattering)

SIRENKO, G. A.; KHOTKEVICH, V. I.

X-ray analysis of the kinetics of removing distortions in the crystal lattice of plastically deformed metals. Fiz. met. i metalloved. 14 no.4:542-547 O '62. (MIRA 15:10)

1. Khar'kovskiy gosudarstvennyy universitet.

(Crystal lattices—Defects)
(X Rays—Diffraction)

MISHULOVICH, L.Ya.; SIRENKO, G.D.

Colored pastes for ceramic tiles. Stek.i ker. 19 no.12:25-27 D '62. (MIRA 16:1)

1. Khar'kovskiy zavod metlakhskikh plitok.
(Clay) (Tiles)

BUGLOV, G.N.; SIRENKO, I.F.

Organization of topographic operations in the Ukrainian Aerial Geodetic Institute. Geod.i kart. no.3:62-64 My '56. (MLRA 9:10)
(Ukraine--Topographical surveying)

3(4)
AUTHORS: Sirenko, I. F., Brodetskiy, Ye. S. SOV/6-59-8-17/27

TITLE: Competition for the Title of Brigades of Communist Work at the Ukrainian Aerogeodetic Enterprise (Sorevnovaniye za zvaniye brigad kommunisticheskogo truda v Ukrainskom aerogeodeticheskom predpriyatii)

PERIODICAL: Geodeziya i kartografiya, 1959, Nr 8, pp 64-65 (USSR)

ABSTRACT: Several months have passed since the competition first started at the above enterprise. A public meeting of Komsomol members was held on June 4. The young people of the enterprise attended the meeting in order to hear what the situation of the competition was. The following persons took the floor: Ira Shishova, Secretary of the Komsomol Organization, opened the meeting. The next speaker was Engineer Nelli Rytsk (other members of the brigade are Sinitskaya, Nikolayeva, Spareva, Protasevich), followed by Galya Zozulya, in whose brigade there is also Ludmila Kucheruk (the brigade cooperates closely with the brigade of Mayya Karpyuk), and Tanya Kissa, in whose brigade are Nadya Polozova, Tamara Tikhonova, Ira Logvinenko,

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Lyuda Stepanenko, Raya Kotel'nikova. Another speaker was Nina Boykova, a worker from the candy factory imeni Karla Marksa (imeni Karl Marx), who discussed the experiences gathered in her brigade. - The meeting agreed to fulfil the Seven-Year-Plan in six years.

SIRENKO, I.I.

Neutralization and dichlorination of acid anolyte chloride.
Khim. prom. [Ukr.] no.3:13-15 Jl-S '64. (MIRA 17:12)

SIRENKO L. A.

USSR/Physiology Of Plants. Respiration and Metabolism I-1

Abs Jour : Ref Zhur-Biologiya, No 2, 1958, 5597

Author : L. A. Sirenko
Inst : Not given
Title : On the Turning Green of Potato Tubers in Light

Orig Pub : Nauk. zap. Eifs'k. un-ta, 1956, 15, No 4, 127-134

Abstract : The effect of chlorophyll accumulation on the content of water, dry matter, vitamin C, on the activity of catalase and on carbohydrate metabolism in potato tubers of the varieties Oktyabrenok (medium early), Stolichnyy (early), Katyusha (medium late), and Spirtovic obtained at the Nimishayevskaya Station of potato growing (Kiev Oblast) was studied. Tubers kept under natural light for prolonged periods of time (from 20 to 40 days) accumulated chlorophyll. Late

Card 1/2

MIKHAYLO, L. L., Master Biolog. Sci.— (diss) "Storage conditions and their effect on the metabolism of potato tubers." Kiev, 1957, 19 pp (Kiev State University im. T. G. Shevchenko, Dept of plant physiology and biochemistry), 100 copies.

(KL, No 40, 1957, p.92)

Country : USSR
CATEGORY :

SS. JOUR. : RZBiol., No. 19, 1958, No. 87052

AUTHOR : Sirenko, L. A.
INST. : Kiev University
TITLE : The Effect of Different Conditions of Storage on Metabolism of Potato Tubers.

PUB. : Nauk. zap. Kiivs'k. un-t, 1957, 16, No 1, 141-164

ABSTRACT : Experiments conducted at the Kiev University to study the effect on biochemical processes in tubers of varieties of potatoes, of the conditions of storage over period of 8 months, in cellars, heaps, basements, earth-vered heaps, and in trenches, have shown dynamics of rbohydrates and N-compounds, composition of free amino-ds, and preservation of ascorbic acid, are influenced t only by storage conditions, but also, to a considerable ent, by variety-characteristics of potatoes. Tubers of ly varieties, in which the synthetic activities of zymes of the group of carbohydrases are of a higher level, cumulate much less of soluble carbohydrates, than tubers early varieties. Low temperature promotes accumulation

CARD: 1/2

: Cultivated Plants. Potatoes. Vegetables. Melons. S.

: Ref Zhur -Biologiya, No. 5, 1959, No. 20280

AUTHOR : Sirenko, L.A.
INST. : Kiev University
TITLE : The Effect of Storing Potatoes on the Ascorbic Acid Content and Activity of Certain Oxidizing Enzymes.
ORIG. PUB.: Nauk. zap. Kiivs'k. un-t, 1957, 16, No.20, 95-105

ABSTRACT : Throughout the eight month period when potatoes of the Stolichnyy and Oktyabrenok (early maturing), Katyusha (average maturing) and Spirtovik (late maturing) varieties were stored in a cellar, tubs, a basement, a ditch and in outdoor pits, a study was made of the effect of the storage conditions on the ascorbic acid content (A), as well as on the activity of ascorbinoxidase, peroxidase, polyphenoloxidase and catalase in the tubers. A low temperature

CARD: 1/3

CARD 2 :

TITLE : Cultivated Plants.

PUB. JOUR.: Ref Zhur-Biologiya, No. 5, 1959, No. 20280

AUTHOR :

INST. :

TITLE :

ORIG. PUB.:

ABSTRACT : (1.3-5.8°) produced an increase in the A content. At the beginning of tuber sprouting the A content increased, and then with further sprouting diminished. The greater the A content, the higher was the ascorbinoxidase activity, while with a lower temperature (still in the plus range) the activity of this enzyme and peroxidase increased. In tubers of the late ripening varieties peroxidase activity was higher than in the early maturing

CARD : 2/3

PROTSENKO, D.F. [Protsenko, D.P.]; SIRENKO, L.A.

Dynamics of chlorophyll a and b and the activity of chlorophyllase in apple trees of various winter hardiness. Visnyk Kyiv.un. no.2. Ser.biol. no.1:37-41 '59. (MIRA 16:4)
(APPLE) (CHLOROPHYLL) (PLANTS--FROST RESISTANCE)

BELOKON', I.P. [Bilokin', I.P.]; GOLYNSKAYA, Ye.L. [Golyns'ka, IE.L.]; KARNAUKHOVA, L.A.; SIRENKO, L.A.

D.P.Protsenko; on his 60th birthday. Ukr.bot.zhur. 16 no.6: 101-103 '59. (MIRA 13:5)
(Protsenko, Dmitrii Filippovich, 1899-)

PROTSENKO, D.F. [Protsenko, D.P.]; SIRENKO, L.A.

Adaptive reactions of fruit crops in temperature and northern latitudes. Visnyk Kyiv.un. no.3[illegible] Ser.biol. no.1:35-55 '60. (MIRA 16:4)

(APPLE—VARIETIES) (PLANTS—FROST RESISTANCE)

PROTSENKO, D.F. [Protsenko, D.P.]; SIRENKO, L.A.; STETSENKO, N.M.

Photosynthetic processes and frost resistance of plants. Visnyk. Kyiv. un. no.4. Ser. biol. no.2:16-27 '61. (MIRA 16:6)
(PHOTOSYNTHESIS) (PLANTS—FROST RESISTANCE)
(APPLE—VARIETIES)

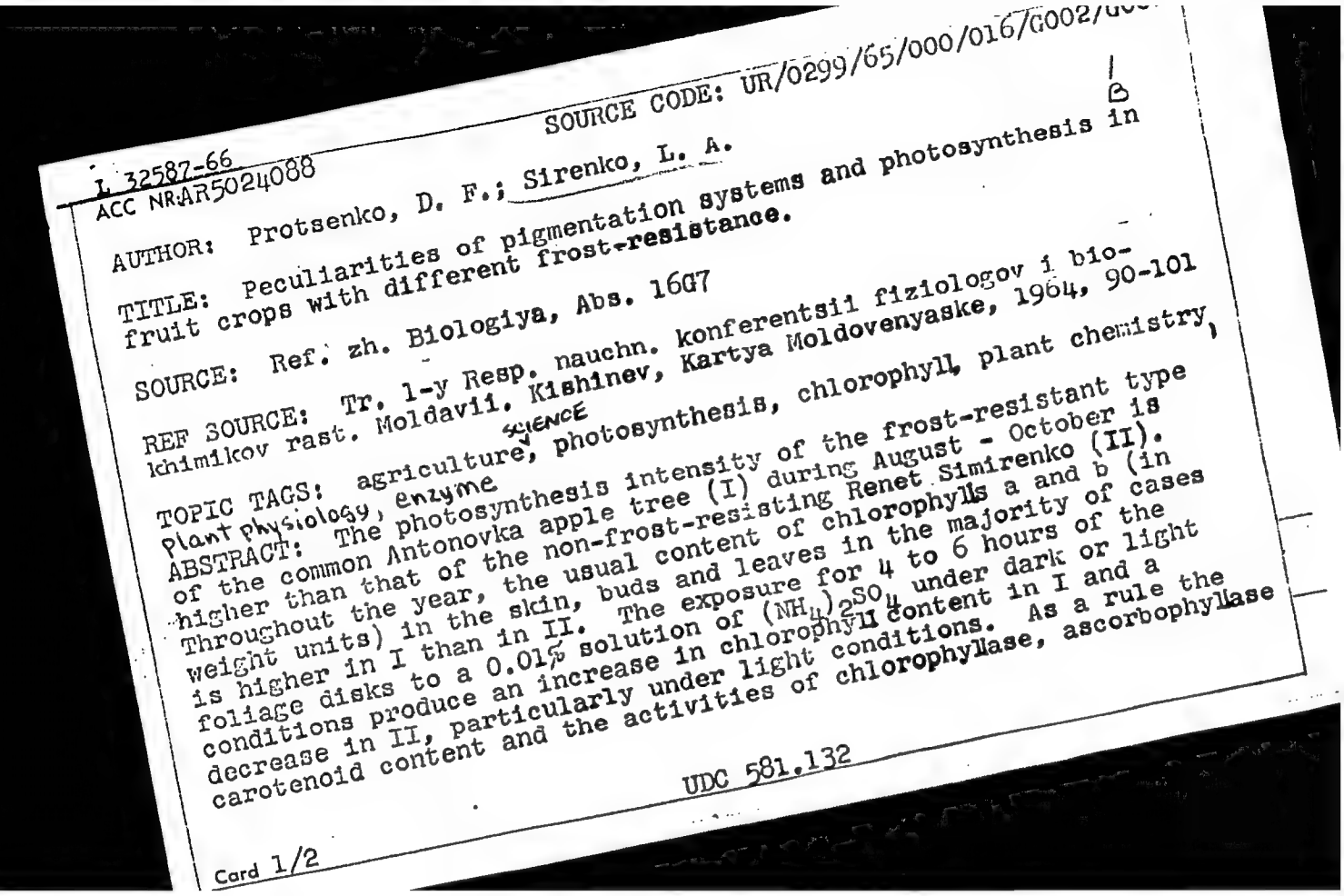
SUD'INA, Ye.G. [Sud'ina, O.H.]; SIRENKO, L.A.

Photoelectrocolorimetric determination of the quantity of chlorophylls a and b. Dop.AN URSR no.7:960-963 '61. (MIRA 14:8)

1. Institut botaniki AN USSR. Predstavleno akademikom AN USSR D.K.Zerovym.
(Chlorophyll) (Paper chromatography)

SIRENKO, L.A.; BOGDANOVA, T.L. [Bohdanova, T.L.]

Stimulating the development of Anabaena variabilis culture by the use of physiologically active substances. Visnyk Kyiv.un. no.5. Ser.biol. no.2:7-9 '62. (MIRA 16:5)
(ALGAE—CULTURES AND CULTURE MEDIA)
(GROWTH PROMOTING SUBSTANCES)



L 32587-66
ACC NR: AR5024088 SOURCE CODE: UR/0299/65/000/016/G002/G0

AUTHOR: Protsenko, D. F.; Sirenko, L. A.

TITLE: Peculiarities of pigmentation systems and photosynthesis in fruit crops with different frost-resistance.

SOURCE: Ref. zh. Biologiya, Abs. 16G7

REF SOURCE: Tr. 1-y Resp. nauchn. konferentsii fiziologov i biokhimikov rast. Moldavii. Kishinev, Kartya Moldovenyaske, 1964, 90-101

TOPIC TAGS: agriculture, photosynthesis, chlorophyll, plant chemistry, plant physiology, enzyme

ABSTRACT: The photosynthesis intensity of the frost-resistant type of the common Antonovka apple tree (I) during August - October is higher than that of the non-frost-resisting Renet Simirenko (II). Throughout the year, the usual content of chlorophylls a and b (in weight units) in the skin, buds and leaves in the majority of cases is higher in I than in II. The exposure for 4 to 6 hours of the foliage disks to a 0.01% solution of $(NH_4)_2SO_4$ under dark or light conditions produce an increase in chlorophyll content in I and a decrease in II, particularly under light conditions. As a rule the carotenoid content and the activities of chlorophyllase, ascorbophyllase

UDC 581.132

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ACC NR: AR5024088

and peroxidase is decreased under light and increased under dark conditions. The authors explain the increase of photosynthesis intensity in I by the greater photoresistance of the chlorophyll-albumen complex and a higher level of oxidizing-reducing processes. The content of albumen in leaves before the end of August is greater in I, after which time it is greater in II. However, the accumulation of glucose is in reverse ratio: it is greater in II earlier in the year, and greater in I in the autumn. The authors recommend the use of the above indicated physiological-biological indexes for diagnosing the frost-resistant degree of plants in comparing them with local varieties and in selecting prospective hybrides. Orig. art. has: 27 references.
G. Il'kun

SUB CODE: 06/ SUBM DATE: none

Card 2/2

SIRENKO, L.A.

Pigment and enzyme systems of blue-green algae. Ukr. bot. zhur. 21 no.5:3-17 '64. (MIRA 18:2)

1. Kiyevskiy gosudarstvennyy universitet, kafedra fiziologii i biokhimii rasteniy.

SIRENKO, L.A.; VOLKOV, I.V.; MUZYCHENKO, A.D.; ARENDARCHUK, V.V.; BRAYON, A.P.; CHERNOUSOVA, V.M.

Effect of electric current on the mass species of blue-green algae in cultivation. Gidrobiol. zhur. 1 no.4:69-70 '65. (MIRA 18:10)

1. Institut gidrobiologii AN UkrSSR; Institut elektrodinamiki AN UkrSSR i Kiyevskiy gosudarstvennyy universitet.

SAMSONOV, G.V.; SIRENKO, L.M.

Catalytic decomposition of albomycin on the SDV-3 ion exchange resin. Trudy Len.khim.-farm.inst. no.15:221-223 '62. (MIRA 15:11)

(ALBOMYCIN) (ION EXCHANGE RESINS)

YEGORKIN, N.I.; SIRENKO, M.P.

Coating films for chrome leather made from carboxyl-containing latexes. Kozh.-obuv.prom. 2 no.3:28-29 Mr '60. (MIRA 14:5)
(Leather) (Latex)

SIRENKO, N., mayor

Screw clamp for removing packing from pipe flanges. Tyl i snab. (MIRA 14:6)
Sov.Voor.Sil 21 no.1:89 Ja '61.
(Pipe joints)

SIRENKO, N., mayor

Reduced use of manual labor. Tyl i snab. Sov. Voor. Sil. 21 no.8: 81-83 Ag '61. (MIRA 14:12)

(Tank cars--Cleaning)
(Loading and unloading--Equipment and supplies)

SIRENKO, N., mayor

Centrifuge for removing water from reservoirs. Tyl i snab. Sov. Voor. Sil 21 no.11:87-88 N '61. (MIRA 15:1)
(Centrifuges)
(Gasoline--Storage)

J-4

USSR/Soil Science - Organic Fertilizers.

Abs Jour : Ref Zhur - Biol., No 9, 1958, 39034

Author : Sirenko, N.A.
Inst :
Title : Green Manure Under Conditions of Irrigated Agriculture of the Southern UkrSSR.

Orig Pub : V sb. Mestn. organ. udobreniya UkrSSR, Kiev, AN UkrSSR, 1957, 173-183.

Abstract : In experiments made in 1951-1954 by the Institute of plant physiology and agrochemistry of the AN UkrSSR the green over the stubble manure under conditions of irrigated agriculture of the southern UkrSSR, improved the physical and physico-chemical soil properties and increased the yield of cotton, tomatoes and potatoes. The action of the green manure with the background of $P_{60}K_{45}$ was greater than the effectiveness of the manure introduced in doses of 20 t/ha. Best results were obtained with white vetch, yellow trigonella

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USSR/Soil Science - Organic Fertilizers. J-4

Abs Jour : Ref Zhur - Biol., No 9, 1958, 39034

and pea. White vetch produced up to 27 t/ha of the green mass containing 200 kg N. Blue and yellow lupine and blue trigonella have a lesser productivity and are of a low-effectiveness. Bean and lobelia (lobiya) are sensitive to frost.

Card 2/2

USSR / Soil Science. Soil Genesis and Geography. J

SIRENKO, N. A., Cand of Agric Sci -- (diss) "Forms of Nitrogen in the Black Soils of the Ukraine in Connection with the Efficacy of Nitrogen Fertilizing by Means of Grass Seeding and by Planting a Legume Crop Under Both Cultivated and Noncultivated Conditions," Kiev, 1959, 20 pp (Ukrainian Academy of Agricultural Sciences; Ukrainian Scientific Research Institute of Plant Physiology) (KL, 2-60, 116)

SIRENKO, N.I., inzh.; NUZHNYY , V.G., inzh.

Testing of electric motors with repeated short-term duration operation. (MIRA 17:11)
Energetik 12 no.10:22-23 O '64.

KOROVYAKOVSKIY, I.G., inzh.; SIRENKO, N.I., inzh.; NAUMENKO, Yu.N., inzh.

A hammer in the capacity of a transducer. Prom. energ. 19 no.8: 20-22 Ag '64. (MIRA 17:11)

SIRENKO, N.I.

Improving the design of stop gears of steel-teeming laddles. Biul. TSNIICHM no.15:44 '57. (MIRA 11:5)

1. Yenakiyevskiy metallurgicheskiy zavod.
(Metallurgical plants--Equipment and supplies)

NAUMENKO, Yu.N., inzh.; SIRENKO, N.I., inzh.

Special operating features of the electric drive for moving the manipulator of a free forge. Vest. elektroprom. 34 no.8:16-19 Ag '63. (MIRA 16:9)

(Forging)

SIRENKO, N.I., inzh.; NAUMENKO, Yu.N., inzh.

Lightened operation of round load-hoisting electromagnets.
Prom.energ. 19 no. 2:20-21 F '64. (MIRA 17:5)

KLYUSHIN, G.V.; MOSHKEVICH, Ye.I.; NAUMENKO, Yu.N.; SIRENKO, N.I.

Operation of a large-capacity, coreless, induction furnace. (MIRA 18:2)
Metallurg 9 no.12:23-25 D '64.

1. Zavod "Dneprospetsstal'" i Zaporozhskiy mashinostroitel'nyy institut.

ROMANTSEVICH, M.K. [Romantsevych, M.K.]; SHOLOGON, I.M. [Sholohon, I.M.]; BARANOVSKAYA, N.F. [Baranovs'ka, N.F.]; SIRENKO, N.N.

Synthesis of dicyclopentadienedicarboxylic acid. Khim. prom. [Ukr.] no.1:20-22 Ja-Mr '65. (MIRA 18:4)